

CLAIMS

1. Peripheral device comprising means for printing a paper sheet, means for cutting the said paper sheet and means for receiving instructions, characterised in that the print means comprise a first print head (4) by ink ejection, supplied by a conventional ink cartridge to print text (9) or drawings on the sheet of paper (3) as a function of the received instructions, a second print head (1) by ink ejection, supplied by an absorbent ink cartridge capable of in depth penetration into the paper sheet to eject ink onto the locations to be cut out as a function of the received instructions, and the cutting means comprise a low power laser (2) emitting a laser beam with a wavelength absorbed by locations marked with absorbent ink (7) as a function of instructions received, the power of the laser being sufficient to cut (11) the paper sheet at the inked locations and / or for partial ablation (10, 13) of the paper.

2. Device according to claim 1, characterised in that the absorbent ink comprises mineral or organic pigments and a solvent.

3. Device according to claim 1, characterised in that the absorbent ink is designed such that locations inked with absorbent ink (7) absorb at least 50% of the laser beam at its operating wavelength.

4. Device according to claim 1, characterised in that the absorbent ink is designed such that locations inked with absorbent ink (7) absorb 80% or more of the laser beam at its operating wavelength.

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5. Device according to claim 3 or 4, characterised in that the absorbent ink maintains its good absorption properties at the laser wavelength up to a temperature equal to at least 200°C and preferably up to 250°C.

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6. Device according to claim 1, characterised in that the absorbent ink comprises a constituent that produces exothermal combustion when it reaches a critical temperature, this critical temperature being between 150°C and 400°C.

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7. Device according to claim 1, characterised in that the absorbent ink is colourless in the visible range.

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8. Device according to claim 1, characterised in that the absorbent ink is white in the visible range.

9. Device according to claim 1, characterised in that the second print head (1) ejects ink so as to print patterns in the form of lines, dashes or dots not more than 500 µm wide.

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10. Device according to claim 1, characterised in that the second print head (1) ejects a quantity of ink equal to between 0.5 and 5 nl per mm of cut line.

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11. Device according to claim 1, characterised in that the laser (2) emits a laser beam with a wavelength of between 650 and 1600 nm.

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12. Device according to claim 1, characterised in that the laser (2) has an average light power between 0.5 and 10 watts.

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13. Device according to claim 12, characterised in that the laser (2) has an average light power between 1 and 4 watts.

14. Device according to claim 12 or 13, characterised in that if the laser (2) operates in pulsed mode, the laser average power is at least 100 times lower than the laser peak powers.

15. Device according to claim 12 or 13, characterised in that if the laser (2) operates in pulsed mode, the laser average power is at least 10 times lower than the laser peak powers.

16. Device according to claim 1, characterised in that the laser (2) comprises one or several semi-conducting laser diodes.

17. Device according to claim 1, characterised in that the laser (2) comprises a laser beam focusing device (18).

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18. Device according to claim 17, characterised in that the laser beam focusing device (18) outputs a light spot with dimensions between 10 μm and 400 μm , on a field depth equal to at least 80 μm .

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19. Device according to claim 1, characterised in that the paper sheet printing means and cutting means are located on the same lateral displacement carriage (5).

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20. Device according to claim 1, characterised in that at least one face of the paper sheet (3) close to the area illuminated by the laser is in contact with a material with a thermal diffusivity equal to at least 15 10 times more than the thermal diffusivity of the paper.

21. Device according to claim 20, characterised in that the material (17) in contact with the paper sheet 20 close to the area illuminated by the laser is in the form of a laser cutting head which comprises :

- a contact area in contact with the sheet and having a surface of at least 0.5 cm^2 ;
- a perforated part in this contact area 25 enabling passage of the laser beam (19), and with a section equal to or greater than 1 mm^2 at the location at which it comes into contact with the paper ;
- a pure air inlet (20) and a combustion fumes evacuation duct (21).

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22. Procedure for aligning a conventional ink cartridge (4) with the laser beam of the device according to any one of claims 1 to 21, characterised in that it is done as follows :

5 - a first series of parallel marks is made on a paper sheet using the ink cartridge of the first print head (4), these marks being separated by a determined pitch ;

 - a second series of parallel marks is then
10 made facing the first series of marks, using the ink cartridge of the second print head (1), the inking width of the said marks in the second series being sufficient to compensate for any possible misalignment between the absorbent ink cartridge and the laser, and
15 being spaced by a second determined pitch different from the first pitch ;

 - laser cuts (partial or total) are then made on the series of marks inked with absorbent ink, using the laser (2) ;

20 - cuts are observed and information is sent to the printer or the computer controlling the printer to identify which marks printed with conventional ink coincide with the cuts.

25 23. Procedure for aligning an absorbent ink cartridge (1) with the laser beam of the device according to any one of claims 1 to 21, characterised in that it is done as follows :

 - a first area of parallel marks is made on a
30 paper sheet using the absorbent ink cartridge of the second print head, each mark being separated by a first

determined pitch and having a width not exceeding the width of the laser spot ;

- the laser beam is used to make lines of spots in the marked area, the lines of spots being parallel
5 to the previous marks and being separated by a determined pitch different from the first pitch ;

- marks are observed and information is sent to the printer or the computer controlling the printer to identify which marks have been cut.

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24. Procedure for adjusting the cutting speed of the device according to any one of claims 1 to 21, characterised in that it is done as follows :

- marks are made on a sheet (3) using the ink
15 cartridge of the second print head ;

- the laser spot is passed over these marks at different speeds ;

- the operator observes the conditions under which a complete cut can be obtained.

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25. Computer system including firstly a computer and software, and secondly a peripheral device according to any one of claims 1 to 21, the computer and the software being used to define patterns (7) to
25 be cut out coherent with the patterns (8) to be printed that are to be made on a paper sheet, and providing instructions to the peripheral device so that this peripheral device can make these printouts and cuts.

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26. System according to claim 25, characterised in that the computer and the software supply instructions

to the peripheral device so that it can make interruptions in the paper cut following the target cutting pattern.

5 27. System according to claim 26, characterised in that it determines cut paper areas to be eliminated, using an appropriate marking (9) done with the first print head (4), leaving the operator free to manually detach these cut paper areas later.

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28. Method for creating documents or paper objects, characterised in that it uses the computer system according to one of claims 25 to 27.

15 29. Method for making a glued structure, comprising the following steps :

- make a document from a sheet of paper (3) using the computer system according to any one of claims 25 to 27, the said document comprising at least
20 one part on which glue is to be applied marked by a gluing pattern ;

- a multi-layer comprising, in order, a silicone coated support (25), an adhesive film (26), and a printable surface film (27) is fed into the
25 peripheral device, the adhesive film (26) bonding to the film (27) better than to the support (25), and bonding to the document made in the first step better than to the film (27), the film (27) and the adhesive film (26) being absorbent at the operating wavelength
30 of the laser ;

- a gluing pattern (29) corresponding to the gluing pattern made on the document is made on the multi-layer by printing the surface film using the first print head of the peripheral device ;

5 - a cut (28) is then made on the multi-layer using the laser, in order to delimit an area surrounding the gluing pattern in the surface film (27) and the adhesive film (26), with dimensions corresponding to the part of the document on which glue
10 is to be applied ;

- the said area is separated from the silicone coated support ;

- the adhesive film side of the area is positioned on the document making the gluing patterns
15 of the document and the surface film correspond ;

- the surface film is removed from the said area ;

- the operator sticks a part of the document on which the adhesive film is located, or another
20 document.